Claims

1. A parking brake actuator mechanism for setting and releasing an automotive brake comprising:

a reversible drive motor having a rotary output gearing;

a pivot member driven by said drive motor output and mounted to be pivoted about a rotary support in an actuator housing in either direction;

a cable wind up wheel rotatably supported in said housing and having an operator a cable wrapped onto a perimeter of said wind up wheel to be wound up thereon upon rotation in one direction and unwound therefrom upon rotation in an opposite direction;

a clutch establishing a driving connection between said pivot member and said wind up wheel upon rotation of said motor in a brake apply direction;

said clutch including a release feature and said actuator mechanism including a fixed disengagement feature located to engage said clutch disengagement feature and cause consequent disengagement of said clutch upon continued rotation of said pivot member in a release direction.

2. An actuator mechanism according to claim 1 wherein said clutch comprises a wrapped spring clutch having an arm connected to said pivot member and windings wrapped over a drum surface on said wind up wheel, said spring clutch establishing a rotary driving connection between said pivot member and said wind up wheel by gripping of said drum surface.

3. An actuator mechanism according to claim 1 further including a pretensioned torsion developing spring connected at one end to said wind up wheel to urge said rotation thereof in a direction to create tensioning of said cable, said torsion developing spring anchored at another end relative said pivot member, whereby upon release of said clutch, said prewound torsion developing spring tensions said cable by urging wind up of said winding wheel.

4. An actuator mechanism according to claim 1 wherein said motor driven output gearing is self locking to hold said cable in tension upon deactivating said motor.

5. An actuator mechanism according to claim 4 further including a load sensor producing signals corresponding to said cable tension, and a control circuit connected to said load sensor deactivating said motor in response to receipt of a signal produced by a cable tension indicating a brake set condition.

6. An actuator mechanism according to claim 1 further including a position sensor sensing the extent of releasing rotation of said pivot member and a motor control circuit connected to said sensor causing said motor to be deactivated after sufficient releasing rotation to insure engagement of said disengagement feature with said fixed feature upon continued rotation of said wind up wheel to disconnect said driving connection of said pivot member to said wind up wheel.

7. An actuator mechanism according to claim 6 further including a prewound torsion developing clock spring connected at one end to said wind up wheel to urge said rotation thereof in a direction to create tensioning of said cable, said torsion developing clock spring anchored at another end relative said pivot member, whereby upon release of said clutch, said prewound torsion developing clock spring tensions said cable by urging wind up of said winding wheel.

8. An actuator mechanism according to claim 2 further including an auxiliary drum connected to said pivot member and located adjacent to said wind up wheel drum surface and having a drum surface matched thereto said wind up wheel drum surface so that said spring clutch grip both of said drum surfaces to reduce wear on said wind up wheel drum surface.

9. An actuator mechanism according to claim 1 further including a manual release element selectively movable to disengage said clutch by engagement with said clutch disengagement feature.

10. An actuator mechanism according to claim 9 further including a torsion developing clock spring connected at one end to said wind up wheel to urge said rotation thereof in a direction to create tensioning of said cable, said clock spring anchored at another end relative said pivot member, whereby upon release of said clutch, said pretensioned torsion spring tensions said cable by urging wind up of said winding wheel.

11. An actuator mechanism according to claim 2 wherein said wind up wheel is rotatable upon a drive shaft extending to said pivot member and drivingly mated to a hole in said pivot mechanism to establish a rotary connection therewith.

12. An actuator mechanism according to claim 11 further including an auxiliary drum having a hole through which said drive shaft extends with a mating interfit therebetween creating a driving connection, said auxiliary drum having a drum surface matching said wind up wheel drum surface and adjacent thereto, said spring clutch received over both of said drum surfaces.

13. An actuator mechanism according to claim 5 wherein said load sensor is connected to said cable to measure the tension therein.

14. An actuator mechanism according to claim 5 wherein said load sensor is associated with a rotary support for said wind up wheel and measures a reaction force caused by said cable tension.

15. An actuator mechanism according to claim 5 wherein said load sensor comprises a strain gauge mounted to a bracket supporting a rotary support for said pivot member.

16. An actuator mechanism according to claim 3 wherein said wind up wheel has a cylindrical cavity formed therein and wherein said tensioning spring comprises a clock

spring disposed in said winding wheel cavity.

17. An actuator mechanism according to claim 16 wherein said clock spring has an outer winding connected to a cylindrical outer wall defining said cavity.

18. An actuator mechanism according to claim 16 further including a drive shaft extending through said winding wheel which is freely rotatable thereon, said drive shaft extending to said pivot member and engaged therewith to establish a rotary connection, said clock spring having an inner winding connected to said drive shaft.

19. An actuator mechanism according to claim 1 wherein said pivot member comprises a sector gear and said motor output includes a pinion gear engaged with said sector gear.

20. A method of actuating an automotive parking brakes comprising:

wrapping an operator cable connected to operate said parking brakes around a rotatable wind up wheel;

drivingly connecting a reversible electrical motor to said wind up wheel to enable winding or unwinding of said operator cable therefrom by selective operation of said motor in either direction;

sensing the level of loading of said operating cable when operating said motor in a direction winding up said cable to apply said parking brake;

deactivating said motor upon reaching a predetermined sensor loading of said cable; and

holding said cable in said load condition after deactivation of said parking brake; and

deactivating said motor after operation of said motor in a direction unwinding said cable to release said parking brake.

21. The method according to claim 20 wherein rotating of said wind up wheel by said motor is done through a normally engaged clutch, and said clutch is disengaged after continued operation of said motor in a direction unwinding said cable to release said parking brake, and further including reengaging said clutch upon rotation of said wind up wheel by operation of said motor in a direction tending to wind up said operator cable.

22. The method according to claim 21 including applying a constant torsional force to said wind up wheel tending to wind up said operating cable thereon sufficient to eliminate slack but not sufficient to apply said parking brake whereby when said clutch is disengaged a pretensioning is created in said operator cable prior to engaging said clutch.

23. The method according to claim 22 including selectively manually releasing said clutch to release said parking brake and reengaging said clutch upon activation of said motor to reapply said parking brake.

24. The method according to claim 20 including sensing said cable loading by sensing a reaction force at the rotational support of said wind up wheel.

25. The method according to claim 21 wherein said clutch is disengaged by a predetermined extent of rotation of said wind up wheel in a cable unwind direction.

26. The method according to claim 25 including sensing the position of said wind up wheel when rotated in said unwind direction and deactivating said motor after sensing an extent of unwinding motion sufficient to disengage said clutch.

27. The method according to claim 20 wherein said driving motor is drivingly engaged with a wind up wheel by a disengageable clutch, and wherein said clutch is released by a manual lever to manually release said parking brake.